



Crustal deformation studies in Iberia: Topo-Iberia CGPS network

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The Topo-Iberia GPS network consists of 26 continuous GPS stations located in Spanish territory of the Iberian Peninsula (22 stations) and in northern Morocco (4 stations). These stations are fully operational since October of 2008. The network has been designed as two X-shaped transects crossing the Iberian Peninsula from NE to SW and NW to SE and extending into North Africa. Additionally, the network has been densified in the seismically most active areas of the Iberian Peninsula: the Betics in the south; the Pyrenees in the north and Galicia in the northwest. The spatial distribution of the stations was chosen to avoid the zones (i.e. Catalonia) where high-quality GPS networks with stable monuments were already in place.

The Iberian Peninsula represents the westernmost part of the Alpine Himalayan Orogenic belt. It is characterized by the ongoing collision between the African (Nubian) and Eurasian plates. A principal objective behind the establishment of the Topo-Iberia GPS network is to monitor millimeter level deformation of the crust due to this collision, as well as, to study possible deformations within the stable part of the Iberian micro-plate. More specific goals include the identification of the areas and/or specific active faults with significant deformation rates, with consequent evaluation of the increased seismic hazard.

The results presented here are based on the data analysis performed at the University of Barcelona. The analysis was performed using GAMIT/GLOBK software from MIT in a network mode strategy using double-differences and with the ambiguities resolved. In total more than 100 CGPS station data from the Iberian Peninsula and adjacent regions has been processed. Specifically, the processed sites include: 26 sites of Topo-Iberia, 22 core stations of IGS and EUREF and the rest of the stations from Spanish national network of IGN and various regional permanent GPS networks in Spain, such as CATNET in Catalonia, ERVA in Valencia, RAP in Andalucía and several other stations from Rioja, Basque country and Castilla y León (IGN). Due to the large number of processed stations, at the initial stage the processing has been performed in four sub-networks with 22 core stations kept in each of the sub-networks to ensure easy unification of the sub-networks at a later stage of the processing.

The presented results are based on the analysis of the data from the beginning of the 2008 to the end of 2010, covering approximately 3 year long time period. Considering this relatively short time period and the fact that the tectonic deformation rates within the Iberian Peninsula do not exceed 2 mm/yr, the results presented here are preliminary and should be treated with care. Since the network was installed, several stations had hardware failures. Unfortunately, most of these problems were related to the faulty choke-ring antennas that had to be replaced. As a consequence, artificial jumps have appeared in the final time-series, that had to be taken into account at a post-processing stage, somewhat worsening the precision of the estimated velocity rates.

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